

CLAIMS

1. An aqueous coating composition comprising:
  - (i) 20 to 80 wt% of a polyurethane A obtained by the reaction of:
    - 5 (a) an isocyanate-terminated prepolymer formed from components comprising:
      - (1) 20 to 80 wt% of at least one polyisocyanate;
      - (2) 3 to 10 wt% of at least one isocyanate-reactive polyol of weight average molecular weight < 500 Daltons, containing at least one ionic or potentially ionic water-dispersing group;
      - (3) 0 to 15 wt% of at least one isocyanate-reactive polyol containing non ionic water-dispersing groups;
      - (4) 17 to 77 wt% of at least one isocyanate-reactive polyol other than (3) of weight average molecular weight  $\geq$  500 Daltons;
      - (5) 0 to 20 wt% of at least one isocyanate-reactive polyol other than (2) or (3) of weight average molecular weight < 500 Daltons;
    - 10 where (1), (2), (3), (4) and (5) add up to 100%;
    - wherein the polyols (a)(3) to (5) have a total ring structure content  $\geq$  48wt%; and
  - (b) an active-hydrogen chain extending compound;
    - 20 wherein polyurethane A has an acid value in the range of from 8 to 40 mg KOH/g and a hard segment content  $\geq$  40 wt% by weight of polyurethane A; and
    - (ii) 80 to 20 wt% of a vinyl polymer B with a glass transition temperature  $\geq$  20°C;wherein (i) and (ii) add up to 100 %;which composition when in the form of a film exhibits a moisture vapour transmission rate of  $\leq$  500g/m<sup>2</sup>/24h .
  - 25 2. An aqueous coating composition according to claim 1 wherein the polyol (a)(4) has a ring structure content  $\geq$  30 wt%.
  3. A composition according to any one of the preceding claims wherein polyurethane A has a weight average molecular weight in the range of from 50,000 to 1,000,000 Daltons.
  - 30 4. An aqueous coating composition according to any one of the preceding claims wherein vinyl polymer B comprises vinyl monomers comprising in total  $\geq$  70 wt% carbon, nitrogen and halogen based on vinyl monomer molecular weight.
  - 35 5. An aqueous coating composition according to any one of the preceding claims wherein the acid value of vinyl polymer B is  $\leq$  10 mg KOH/g polymer.
  - 40 6. An aqueous coating composition according to any one of the preceding claims

wherein the vinyl polymer B has been formed using a multistage polymerisation process to form two or more vinyl polymer phases of different compositions.

7. An aqueous coating composition according to claim 6 wherein there is a difference 5 in Tg values between at least two vinyl polymer phases of  $\geq 20^{\circ}\text{C}$ .

8. A composition according to any one of the preceding claims wherein vinyl polymer B has a weight average molecular weight in the range of from 50,000 to 6,000,000 10 Daltons.

9. An aqueous coating composition according to any one of the preceding claims wherein vinyl polymer B has been formed in the presence of polyurethane A.

10. An aqueous coating composition according to any one of the preceding claims 15 further comprising a radiation curable multifunctional material.

11. An aqueous coating composition according to claim 10 where the radiation curable 20 multifunctional material is selected from the group consisting of epoxy(meth)acrylates, urethane (meth)acrylates, multifunctional (meth)acrylate monomers, uv curable urethane dispersions and amine-(meth)acrylate adducts.

12. An aqueous coating composition according to any one of the preceding claims which when in the form of a film exhibits a total stain resistance value to coffee, ethanol, mustard and red wine of  $\geq 30$ .

25 13. A aqueous coating composition according to any one of the preceding claims which further comprises a pigment.

30 14. A aqueous coating composition according to claim 13 with a pigment volume concentration of from 10 to 35%.

15. A aqueous coating composition according to any one of the preceding claims which is substantially solvent free.

35 16. A process for the manufacture of an aqueous coating composition according to any one of claims 1 to 15 which comprises the following steps:

(I) (i) reaction of components (a)(1) to (a)(5) together to form an isocyanate-terminated prepolymer;  
(ii) neutralisation of the isocyanate-terminated prepolymer;  
40 (iii) dispersion of the isocyanate-terminated prepolymer in water;

(iv) chain extension of the isocyanate-terminated prepolymer by reaction with an active-hydrogen chain extending compound to form polyurethane A; and

(II) admixture of preformed vinyl polymer B.

5 17. A process for the manufacture of an aqueous coating composition according to any one of claims 1 to 15 which comprises the following steps:

(I) (i) reaction of components (a)(1) to (a)(5) to form an isocyanate-terminated prepolymer;

(ii) neutralisation of the isocyanate-terminated prepolymer;

(iii) dispersion of the isocyanate-terminated prepolymer in water;

(iv) chain extension of the isocyanate-terminated prepolymer by reaction with an active-hydrogen chain extending compound to form polyurethane A;

(II) admixture of vinyl monomer followed by reaction under conditions sufficient to effect emulsion polymerisation to form vinyl polymer B.

10 18. A film obtained from an aqueous coating composition according to any one of claims 1 to 15.

15 19. A coating obtained from an aqueous coating composition according to any of claims 1 to 15.

20 20. A method of coating the surfaces of a substrate comprising application of an aqueous coating composition according to any one of claims 1 to 15 to the substrate.

25 21. A method of coating according to claim 20 wherein the substrate is porous.

22. A method of coating according to claim 20 wherein the substrate is wood.